

REMARKS

This paper is responsive to an Office Action dated December 10, 2004. Prior to this amendment claims 1-11 were pending. Claims 1-11 remain pending.

In Section 2 of the Office Action claims 1-3 have been rejected under 35 U.S.C. 102(e) as anticipated by Uchiyama (US 6,489,645). The Office Action states that Uchiyama discloses a MOSFET gate structure having a gate dielectric and a niobium monoxide gate. This rejection is traversed as follows.

"A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros. v. Union Oil of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987).

Generally, Uchiyama describes a memory device made from a superlattice material. An interface buffer layer is formed between the superlattice material and an electrode (Abstract). The superlattice material was invented to address the problems associated with conventional ferroelectric and layered superlattice materials (col. 1-2). At col. 11, ln. 54-57, Uchiyama states that the superlattice material may be a niobium oxide. At col. 12, ln. 5, niobium oxide is mentioned as a possible interface buffer material 120.

The Declaration of Dr. David Evans, enclosed as Attachment A under the provisions of 37 CFR 1.132, states that there are three well-defined oxides associated with niobium. Two of the oxides are insulators, with only niobium monoxide being a conductor. To summarize, Dr. Evans states that only the insulator forms of

niobium oxide can be used to enable Uchiyama's invention. That is, the niobium oxide mentioned by Uchiyama cannot be a conductor (niobium monoxide).

Claim 1 can be distinguished from Uchiyama. Claim 1 recites the use of niobium monoxide as a MOSFET gate material. Uchiyama does not describe the fabrication of a MOSFET gate, or mention any possible gate materials. Further, the FET gate of claim 1 can only be enabled using a conductor. Uchiyama does not describe the use of any conductive niobium oxides, as the conductive form of the oxide has no memory or buffer/insulator properties. Clearly, if Uchiyama used conductive niobium monoxide as either the superlattice material or a buffer layer, his memory device would not function.

Uchiyama does not describe a FET gate made from niobium monoxide. Therefore, he does not describe all the limitations of claim 1. Since Uchiyama does not describe all the limitations of claim 1, he cannot anticipate. Claims 2-3, dependent from claim 1, enjoy the same distinctions from the cited prior art, and the Applicant respectfully requests that the rejection be removed.

In Section 7 of the Office Action claims 4-5 have been rejected as unpatentable under 35 U.S.C. 103(a) with respect to Uchiyama in view of Ma ("High-k Gate Dielectrics..."). The Office Action acknowledges that Uchiyama does not disclose a high-k dielectric, but states that Ma's use of a high-k dielectric, in combination with Uchiyama, would make the claimed invention obvious. This rejection is traversed as follows.

An invention is unpatentable if the differences between it and the prior art would have been obvious at the time of the invention. As stated in MPEP § 2143, there are three requirements to establish a *prima facie* case of obviousness.

First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and reasonable expectation of success must both be found in the prior art and not based on applicant's disclosure. *In re Vaeck* 947 F.2d 488, 20 USPQ2d, 1438 (Fed. Cir. 1991).

With respect to the first *prima facie* requirement, even if Ma does describe the use of a high-k dielectric, there is no suggestion in the Ma reference that Uchiyama be modified in such a way as to make the claimed invention obvious. Since neither reference describes the use of niobium monoxide as a gate electrode or a conductor, the combination of references cannot be said to make a niobium monoxide gate obvious. Alternately considered, if an expert were given the two references as a starting point, there would be no reasonable expectation that the expert could successfully derive the claimed invention, which is the second *prima facie* requirement. There is no expectation of success because neither reference suggests the use of a conductive niobium oxide as a starting point.

With respect to the third *prima facie* requirement, the references, even in combination, do not describe all the elements of

claim 1. That is, neither reference teaches the use of niobium monoxide as a FET gate material. Therefore, the two references do not explicitly describe all the limitations of claim 1. Neither does the combination suggest modifications that would make claim 1 obvious. Claims 4 and 5, dependent from claim 1, enjoy the same benefits and the Applicant requests that the rejection be removed.

In Section 9 of the Office Action, claims 6-7 have been rejected as unpatentable under 35 U.S.C. 103(a) with respect to Uchiyama in view of Gonzalez et al. ("Gonzalez"; US 6,468,852). The Office Action acknowledges that Uchiyama does not disclose a capping layer overlying the niobium monoxide gate, but states that Gonzalez's use of a Si nitride capping layer, in combination with Uchiyama, would make the claimed invention obvious. This rejection is traversed as follows.

With respect to the first *prima facie* requirement, assuming that Gonzalez does describe a Si nitride capping layer overlying the gate, Gonzalez still makes no suggestion that Uchiyama be modified in such a way as to make the claimed invention obvious. Neither reference describes the use of niobium monoxide as a gate electrode, or as a conductor. Therefore, the combination of references cannot be said to make obvious the use of a niobium monoxide gate. With respect to the second *prima facie* requirement, if an expert were given the two references as a starting point, there would be no reasonable expectation that the expert could successfully derive the claimed invention. Again, this would be because neither reference mentions the use of niobium monoxide.

With respect to the third *prima facie* requirement, the references, even in combination, do not describe all the elements of claim 1. That is, neither reference teaches the use of niobium monoxide as a FET gate material. Therefore, the two references do not explicitly describe all the limitations of claim 1. Neither does the combination suggest modifications that would make claim 1 obvious. Claims 6 and 7, dependent from claim 1, enjoy the same benefits and the Applicant requests that the rejection be removed.

In Section 11 of the Office Action claims 8 and 9 have been rejected as unpatentable under 35 U.S.C. 103(a) with respect to Uchiyama in view of Gonzalez, and further in view of Wilson et al. ("Wilson"; HANDBOOK OF MULTILEVEL METALLIZATION...). The Office Action acknowledges that Uchiyama does not disclose a TiN capping layer, but states that Gonzalez' and Wilson's use of a TiN capping layer, in combination with Uchiyama, would make the claimed invention obvious. This rejection is traversed as follows.

With respect to the first *prima facie* requirement, even if Wilson and Gonzalez describe the use of a TiN capping layer, there is no suggestion in these references that Uchiyama be modified in such a way as to make the claimed invention obvious. Since none of the three references describes the use of niobium monoxide as a gate electrode or conductor, the combination of references cannot be said to make obvious a niobium monoxide gate. Alternately considered, if an expert were given the three references as a starting point, there would be no reasonable expectation that the expert could successfully derive the claimed invention, which is the second *prima facie* requirement. There

is no expectation of success because none of the references suggest the use of a conductive niobium oxide.

With respect to the third *prima facie* requirement, the references, even in combination, do not describe all the elements of claim 1. That is, none of the references teach the use of niobium monoxide as a FET gate material. Therefore, the three references do not explicitly describe all the limitations of claim 1. Neither does the combination suggest modifications that would make claim 1 obvious. Claims 8 and 9, dependent from claim 1, enjoy the same benefits and the Applicant requests that the rejection be removed.

In Section 13 of the Office Action claims 10-11 have been rejected as unpatentable under 35 U.S.C. 103(a) with respect to Uchiyama in view of Ma. The Office Action acknowledges that Uchiyama does not disclose a high-k dielectric, but that Ma's use of a high-k dielectric, in combination with Uchiyama, would make the claimed invention obvious. This rejection is traversed as follows.

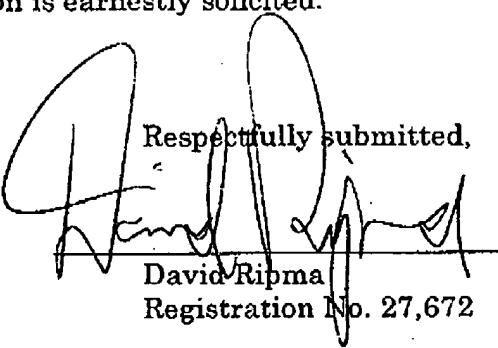
With respect to the first *prima facie* requirement, Ma's high-k dielectric makes no suggestion that Uchiyama be modified in such a way as to make the claimed invention obvious. Neither reference describes the use of niobium monoxide as a gate electrode or a conductor. Therefore, the combination of references cannot be said to make obvious the use of a niobium monoxide gate. With respect to the second *prima facie* requirement, if an expert were given the two references as a starting point, there would be no reasonable expectation that the expert could successfully derive the claimed invention. Again, this would be because neither reference mentions the use of niobium monoxide.

With respect to the third *prima facie* requirement, the references, even in combination, do not describe all the elements of claim 10. That is, neither reference teaches the use of niobium monoxide as a FET gate material. Therefore, the two references do not explicitly describe all the limitations of claim 10. Neither does the combination suggest modifications that would make claim 10 obvious. Claim 11, dependent from claim 10, enjoys the same benefits and the Applicant requests that the rejection be removed.

It is believed that the application is in condition for allowance and reconsideration is earnestly solicited.

Date: 3/3/05

Respectfully submitted,


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